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One Hundred Cases of Hypermetropic Astigmatism Contrary to the Rule, and the Associated Symptoms.

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ONE HUNDRED CASES OF HYPERMETROPIC ASTIGMATISM CONTRARY TO THE RULE, AND THE ASSOCIATED SYMPTOMS.

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Ever since the days when Weir Mitchell called attention to the intimate connection between a variety of headaches and the existence of errors of refraction, before which time this close association had not received at the hands of neurologists extensive study, the literature of ophthalmology and neurology has been burdened with numerous communications upon this relationship, until now the investigation of a case of headache is not complete until the refraction of the eye and the balance of the ocular muscles have been carefully considered. All forms of refraction error are known to be the cause of headaches, but usually it is considered that the presence of astigmatism, either of the simple or compound type, aggravates the amount of the head-pain. It has been stated that when the as-

tigmatism is contrary to the rule, the entire correction of the error is more absolutely necessary to bring relief, and that its uncorrected presence is more potent in producing general nervous phenomena, than when the astigmatism is according to the rule. More than this, the researches of Schoen on the influence of accommodative strain in the production of glaucoma and cataract are important additions to our knowledge of the influence of astigmatism, both of the usual and unusual varieties, upon the ultimate well-being of ametropic eyes. So, also, Theobald, of Baltimore, has studied a number of examples of astigmatism contrary to the rule, and adduced evidence to show that under certain circumstances this condition of refraction may conduce to the development of glaucoma.

The following cases were analyzed because they have been under observation for a sufficient length of time to determine in practically all of them the exact value of their correction, and also to have studied the associated symptoms in sufficient detail to demonstrate whether or not they were out of proportion to the character or the amount of the refraction error. In all of the cases a mydriatic was employed, except in those where the use of such a drug was contra-indicated by glaucomatous symptoms. In patients over 45 the mydriatic was homatropine; in those under 45 either atropine or hyoscyamine. Whenever it was necessary the spherical lens, required by the age of

the patient, was ordered for the purposes of reading and close vision. This glass is not set down in the notes. For the convenience of study, the cases may be gathered into five groups:

I. Cases presenting themselves for treatment on account of optical reasons alone — beginning presbyopia, or dissatisfaction with convex spherical lenses. No pain and no reflex symptoms.

Case 1. Beginning Presbyopia.—M. T., a man aged 41; no headache; no asthenopia; tricky close vision. Healthy fundus, with the exception of slight absorption of the pigment epithelium of the choroid.

O. D. + .25s \bigcirc + .90c axis 15 $\frac{1}{5}$. O. S. + .25s \bigcirc + .75c axis 150 $\frac{1}{5}$. These lenses were entirely satisfactory.

Case 2. Unsatisfactory Reading Glasses (Convex).—F. E., a woman aged 57; no general disease; no ill health or reflex neurosis traceable to eye-strain; unsatisfactory reading glasses. Fundus healthy.

O. D. + .50s \bigcirc + .50c axis 15 $\frac{1}{5}$. O. S. + .50s \bigcirc + .50c axis 165 $\frac{1}{5}$. A satisfactory improvement in reading power.

Case 3. Eye-tire and Blurred Vision at Close Work.—L. K. B., a woman aged 30; perfect general health; no headache but unsatisfactory endurance with simple convex lenses. Normal fundus.

O. D. + 2.s \bigcirc + .25c axis H $\frac{1}{5}$. O. S. + 2.25s \bigcirc + .50c axis 165 $\frac{1}{5}$. The desired improvement resulted.

Case 4. High H; Blurred Vision during Reading.—A. E., a woman aged 44; perfect general health; eyes tire and print blurs; the convex reading lenses do not suffice; no headaches and no asthenopia. Healthy, hypermetropic fundus.

O. D. + 4.50s \bigcirc + .25c axis 15 $\frac{20}{0}$. O. S. + 5.s \bigcirc + .25c axis H $\frac{20}{0}$. These lenses gave the desired relief.

Case 5. Unsatisfactory Reading Glasses.—D. I., a woman aged 63; good general health with the exception of hay fever; glasses—convex sphericals corresponding to age—do not permit entirely comfortable reading, or sufficient eye endurance. Round, somewhat gray-red discs.

O. D. + 1.s \bigcirc + .25c axis 150 $\frac{20}{0}$. O. S. + 2.s \bigcirc + .60c axis 30 $\frac{20}{0}$. These glasses, with a corresponding correction for reading, were satisfactory.

Case 6. No symptoms of Eye-strain; "wants new glasses."—C. W., a woman aged 58; perfect general health; has worn glasses for reading purposes for a number of years which recently have not permitted sufficient eye-endurance. These glasses are simple sphericals. There is no headache. Fundus perfectly normal.

O. D. + .25s \bigcirc + .50c axis 15 $\frac{20}{0}$. O. D. + .75s \bigcirc + .25c axis 165 $\frac{20}{0}$. These lenses have answered a satisfactory purpose.

Case 7. No symptoms of Eye-strain; "wants new glasses."—S. W. M., a woman aged 55; perfect general health; has worn glasses for reading for a number of years, which are simple spheri-

cals and have recently not permitted comfort with reading. The patient states that she had iritis in youth, and the left pupil is slightly distorted above. In each eye the discs are rather gray, but there is no decided lesion of the fundus.

O. D. + 1.25 \bigcirc + .25 axis 15 $\frac{20}{0}$. O. S. + 1.25s \bigcirc + .75c axis H $\frac{20}{0}$. These lenses associated with the proper presbyopic correction have proved entirely satisfactory.

Case 8. Beginning Presbyopia; No Headache.—M. H. T., a woman, aged 44; in perfect general health; complains of some blur of vision at the near point, inability to thread the needle, and slight smarting of the edges of the eyelid; has never worn glasses. In each eye an oval disc; no conus; a fairly healthy eyeground.

O.D. + .25s \bigcirc + 1.25c axis 30 $\frac{20}{0}$. O.S. + .50s \bigcirc + .25c axis 150 $\frac{20}{0}$. These glasses were entirely satisfactory.

Case 9. Unsatisfactory Reading Glasses; No Headache.—J. J. S., a man, aged 55; has never worn any glasses except those which he bought in stores, and is using at present a + 3. D, with which he sees indistinctly at times, but otherwise complains of no symptom at all; his general health is good. The ophthalmoscope shows in each eye an oval disc, somewhat gray in its deeper layers, and a slight gray haze of the retina.

O.D. + 1.50s \bigcirc + .25c axis H $\frac{20}{0}$. O.S. + 1.25s \bigcirc + .50c axis H $\frac{20}{0}$. These lenses, com-

bined with a suitable presbyopic correction, afforded the relief he desired.

Case 10. Unsatisfactory Reading Glasses; No Headache.—A. B., a woman, aged 52; good general health; complains of some mistiness while attempting to read, and also when looking at a distance; never has had an attack of headache. Wears a convex spherical of + 3 D.; media clear; tension normal. Oval discs, with slight veiling of the lower and inner edges.

O.D. + 2.s \bigcirc + .25c axis H $\frac{2}{2}0$. O.S. + 1.50s \bigcirc + 1.25c axis H $\frac{2}{2}0$. These glasses, combined with the necessary addition for reading, answered her purposes very satisfactorily.

Case 11. Imperfect Presbyopic Correction.—A. W., a woman, aged 48, complains neither of pain in the eye nor headache, but does not see satisfactorily with her reading glass which is + 4 D.; general health good; media clear, discs oval; eyegrounds fairly healthy.

O.D. + 2.s \bigcirc + .75c axis H $\frac{2}{2}0$. O.S. + 1.75s \bigcirc + .50c axis H $\frac{2}{2}0$. These glasses, together with a suitable presbyopic correction placed in bifocals, were eminently satisfactory.

Case 12. Imperfect Presbyopic Correction.—E. W. a man, aged 62, in active business and perfect health, never has had a headache; complains that after reading for some time his vision blurs. He has worn presbyopic glasses, convex sphericals, for a number of years, having changed them at suitable intervals, but until recently has had no feeling of discomfort at all. The ophthal-

moscope showed discs not more gray than was natural at his time of life, and the eyegrounds generally healthy.

O.D. + 1.50s \bigcirc + .90c axis 165 $\frac{20}{0}$. O.S. + 1.5 \bigcirc + .90c axis H. $\frac{20}{0}$. The glasses afforded satisfaction.

Case 13. Unsatisfactory Reading Glasses.—J. A., a woman, aged 50, complains that she cannot see distinctly with her reading glasses (+ 3.25); there is occasional slight smarting and burning of the eye lids; no headache; the general health good. In each eye there is a round disc with a slight absorbing crescent at its outer side; the general fundus in good condition.

O.D. + 1.5 \bigcirc + .25c axis H $\frac{20}{0}$. O.S. + 1.25s = + .25c axis 30 $\frac{20}{0}$. This correction, combined with a suitable spherical for reading, gave the desired relief and the indistinct vision disappeared.

Case 14. Insufficient Reading Glasses; Slight Ocular Pain.—C. S. B., a man aged 48, in perfectly good general health, has worn glasses for eight or ten years, always simple, convex sphericals; from time to time he has used his eyes considerably, and also has had slight pain in them, but never any headache or other symptoms. In each eye there was an oval disc; no conus; rather pallid; the fundus in fair condition. O.D. + 1.25s \bigcirc + .25c axis 165 $\frac{20}{15}$. O.S. + .50s \bigcirc + .65c axis H $\frac{20}{15}$. This correction combined with a suitable spherical yielded an excellent result.

Case 15. Imperfect Reading Glasses.—J. A., a

bined with a suitable presbyopic correction, afforded the relief he desired.

Case 10. Unsatisfactory Reading Glasses; No Headache.—A. B., a woman, aged 52; good general health; complains of some mistiness while attempting to read, and also when looking at a distance; never has had an attack of headache. Wears a convex spherical of + 3 D.; media clear; tension normal. Oval discs, with slight veiling of the lower and inner edges.

O.D. + 2.s \bigcirc + .25c axis H $\frac{2}{0}$. O.S. + 1.50s \bigcirc + 1.25c axis H $\frac{2}{0}$. These glasses, combined with the necessary addition for reading, answered her purposes very satisfactorily.

Case 11. Imperfect Presbyopic Correction.—A. W., a woman, aged 48, complains neither of pain in the eye nor headache, but does not see satisfactorily with her reading glass which is + 4 D.; general health good; media clear, discs oval; eyegrounds fairly healthy.

O.D. + 2.s \bigcirc + .75c axis H $\frac{2}{0}$. O.S. + 1.75s \bigcirc + .50c axis H $\frac{2}{0}$. These glasses, together with a suitable presbyopic correction placed in bifocals, were eminently satisfactory.

Case 12. Imperfect Presbyopic Correction.—E. W. a man, aged 62, in active business and perfect health, never has had a headache; complains that after reading for some time his vision blurs. He has worn presbyopic glasses, convex sphericals, for a number of years, having changed them at suitable intervals, but until recently has had no feeling of discomfort at all. The ophthal-

moscope showed discs not more gray than was natural at his time of life, and the eyegrounds generally healthy.

O.D. + 1.50s \bigcirc + .90c axis 165 $\frac{2}{3}$. O.S. + 1.5 \bigcirc + .90c axis H. $\frac{2}{3}$. The glasses afforded satisfaction.

Case 13. Unsatisfactory Reading Glasses.—J. A., a woman, aged 50, complains that she cannot see distinctly with her reading glasses (+ 3.25); there is occasional slight smarting and burning of the eye lids; no headache; the general health good. In each eye there is a round disc with a slight absorbing crescent at its outer side; the general fundus in good condition.

O.D. + 1.5 \bigcirc + .25c axis H $\frac{2}{3}$. O.S. + 1.25s = + .25c axis 30 $\frac{2}{3}$. This correction, combined with a suitable spherical for reading, gave the desired relief and the indistinct vision disappeared.

Case 14. Insufficient Reading Glasses; Slight Ocular Pain.—C. S. B., a man aged 48, in perfectly good general health, has worn glasses for eight or ten years, always simple, convex sphericals; from time to time he has used his eyes considerably, and also has had slight pain in them, but never any headache or other symptoms. In each eye there was an oval disc; no conus; rather pallid; the fundus in fair condition. O.D. + 1.25s \bigcirc + .25c axis 165 $\frac{2}{3}$. O.S. + .50s \bigcirc + .65c axis H $\frac{2}{3}$. This correction combined with a suitable spherical yielded an excellent result.

Case 15. Imperfect Reading Glasses.—J. A., a

woman aged 50, complains that during the act of reading she cannot see distinctly, but otherwise, with the exception of slight burning and smarting at the margins of the lids, has no symptoms of eye-strain; the general health is perfectly good; she has worn glasses for a number of years, always a simple spherical. In each eye there was a round disc with slight crescent at the outer side and an absorbing pigment line beyond.

O. D. + 1.5 \bigcirc + .25c axis H $\frac{20}{20}$. O. S. + 1.25s \bigcirc + .25c axis 30 $\frac{20}{20}$. This correction with a suitable presbyopic addition proved satisfactory.

Case 16. Unsatisfactory Reading Glasses; Slightly Blurred Vision.—M. R. H., a woman aged 54, has worn glasses for many years, but complains that after their use objects blur somewhat; there is no pain and no headache, although the patient herself is a delicate woman having lost much sleep owing to the necessity of nursing a case of prolonged illness in her family. In each eye the disc was an oval, the central lymph sheaths full and the color of the papilla slightly gray.

O. D. + 2.5 \bigcirc + .50c axis 15 $\frac{20}{20}$. O. S. + 2.5 \bigcirc + .50c axis 165 $\frac{20}{20}$. These glasses seem to help her, although the eye endurance has never been great; they certainly proved better than simple sphericals.

Case 17. Imperfect Reading Glasses; No Pain.—E. J. P., a woman aged 58, for years has suffered with a torpid liver and symptoms called dyspeptic

probably owing to the same condition; curiously enough there never has been any pain and no headache; she has worn glasses for years, simple convex sphericals for reading. In each eye an oval optic disc, and scattered through the choroid numerous yellowish dots sometimes discrete and sometimes gathered in clusters; the central lymph sheaths full and the discs rather gray.

O. D. + 1.50s \bigcirc + 2.c axis 15 $\frac{20}{40}$. O. S. + 1.5 \bigcirc + .50c axis H $\frac{20}{15}$. These glasses and the additional lenses suitable for reading purposes gave entire satisfaction; indeed the patient complained of no special symptoms, and except for indistinct vision was reasonably well satisfied with glasses that paid no attention to her astigmatism.

Of these seventeen cases one was under thirty, seven between forty and fifty, and the remaining nine between fifty and sixty-three. In general terms the patients complained very slightly, the chief disability being lack of eye endurance, although in many instances they were people who, glassed as they were with simple convex lenses, yet read and worked at close ranges with comparative comfort. The desired increase in eye endurance came with the addition of the cylinders. It is noteworthy that in fourteen out of the thirty-four eyes examined the correcting cylinder was as low as 0.25 dioptry; its absence was missed and its presence a relief. The eyegrounds in these cases presented no unusual features, and require no comment.

III. Cases characterized by blepharospasm.

symptomatic conjunctivitis, œdema of the lids, epiphora, photophobia, or muscæ.

Case 1. Blepharospasm.—M. A., a boy aged 9 years; perfect general health; no headache; constant blepharospasm. Oval, over-capillary discs; fine retinal striation.

O. D. + .60c axis H $\frac{1}{2}$. O. S. + .25s \bigcirc + .60c axis H $\frac{1}{2}$. Complete relief of the symptoms.

Case 2. Epiphora and Ocular Pain.—S. E., a man aged 62; very gouty; one attack of iritis; ocular pain and lachrymation with eye use. Gray-red discs and remains of former iritis.

O. D. + .75s \bigcirc + .75c axis H $\frac{1}{2}$. O. S. + .90c axis H $\frac{1}{2}$. These glasses afforded relief. In addition the patient took anti-gout diet and iodide of soda.

Case 3. Recurring Attacks of Conjunctivitis; Occasional Temple Headache.—C. T., a woman aged 33; general health good; recurring attacks of conjunctivitis and coarse bulbar injection; some temple headache. No fundus lesion except retinal striation.

O. D. + 1.25s \bigcirc + 1.50c axis 165 $\frac{1}{2}$. O. S. + 3.50s \bigcirc + .75c axis 150 $\frac{1}{2}$. These glasses afforded entire relief.

Case 4. Epiphora.—C. U., a man aged 46; good general health; cannot read at night, and all reading produces epiphora. Fundus normal except slight blurring of the nasal edges of the discs.

O. D. + .50c axis H $\frac{1}{2}$. O. S. + .25c axis 15

1½. The epiphora entirely ceased with the use of this correction added to a corresponding reading lens.

Case 5. Muscæ and Photophobia.—M. L., a woman aged 67; feeble general health without definite disease; reading produces photophobia with web-like film rising before the eyes, the center of the film dotted with darker points. Media clear; gray-red discs, edges slightly mellowed.

O. D. + 1.5 \bigcirc + .60c axis H $\frac{1}{15}$. O. S. + 1.5 \bigcirc + .25c axis 30 $\frac{1}{15}$. These glasses relieved the photophobia, but did not at last accounts remove the muscæ.

Case 6. Photophobia and Ocular Pain.—B. L. J., a woman aged 52; has been the subject of nervous exhaustion and recently underwent the rest cure; now considers herself well; reading produces eye-pain and photophobia. Round discs with slight retinal haze.

O. D. + .25s \bigcirc + .50c axis H $\frac{2}{15}$. O. S. + .25s \bigcirc + .50c axis 15 $\frac{2}{15}$. The result was good.

Case 7. Muscæ; Occasional Supraorbital Neuralgia.—C. T. A., a woman aged 56; subject to rheumatism; loses much sleep; muscæ, supraorbital neuralgia and ocular pain; each lens nucleus strongly marked. Oval, rather gray discs and hazy retinas.

O. D. + .60c axis H $\frac{2}{15}$. O. S. + .25s \bigcirc + .25c axis H $\frac{2}{15}$. These glasses markedly relieved the muscæ and the ocular pain, but not the

supraorbital neuralgia. This was modified by anti-rheumatic treatment.

Case 8. Blepharospasm and Left Headache.—A. C. B., a man aged 18; general health good; has blepharospasm, blepharitis and headache chiefly on the left side; the left eye is amblyopic. There are no lesions of the fundus except that the disc on the left side is grayer than normal at his age of life.

O. D. + 1.25s \bigcirc + .25c axis H $\frac{20}{20}$. O. S. + 2.s \bigcirc + 1.25c axis H $\frac{20}{20}$. Complete relief of the symptoms.

Case 9. (Edema of Lids; Some General Headache.—S. C. a woman aged 20; in poor general health; subject to tonsillitis; has had several attacks of catarrhal jaundice; eyes troublesome since childhood on account of recurring œdema of the lids. The margins of the disc are veiled; tortuous transverse vessels and woolly choroids.

O. D. + 2.s \bigcirc + .90c axis 15 $\frac{20}{20}$. O. S. + 1.50s \bigcirc + 1.25c axis 165 $\frac{20}{20}$. Relief followed. An attack of typhoid fever shortly afterward, prolonged in its course, rendered it difficult to estimate the value the correction.

Case 10. Chronic Hyperæmia; Epiphora.—M. M., a woman aged 47, in good general health, constantly using her eyes, complains of burning, lachrymation, and heaviness of the lids. Inspection of the conjunctiva reveals the somewhat characteristic tear-soaked appearance of chronic hyperæmia. In each eye the disc is gray-red,

and there is undue amount of retinal haze and opacity of the fibre layer.

O. D. + .25s \bigcirc + .37c axis 15 $\frac{20}{0}$. O. S. + .75s \bigcirc + .25c axis 165 $\frac{20}{0}$. The use of these glasses with the proper reading correction and a local astringent wash produced great relief.

Case 11. Vaso-motor Blepharitis; Asthenopia.—C. A. Y., a woman aged 25, excessively nervous; imagines she is going blind; worried about slight redness of the ciliary margins which grows worse after eye use; states that she cannot read or sew with any comfort; has worn for some time a correction very similar to the one given below. Eye-grounds present oval discs; fairly healthy retinas; no conus.

O. D. + 2.25s \bigcirc + .60c axis H $\frac{20}{0}$. O. S. + 3.25s \bigcirc + .90c axis 165 $\frac{20}{0}$. The eyelids improved very considerably under the use of these glasses, although the patient's asthenopia, according to her own statement, did not improve. The field of vision in this case presented more or less the typical characteristics seen in hysterical eyes.

Case 12. Chronic Hyperæmia of the Conjunctiva.—P. S., a man aged 42, complains of some epiphora and smarting of the eyelids, the conjunctiva of which presents the appearances of hyperæmia; he never has had a headache and has no asthenopia. In each eye the lymph sheaths are full and there is undue broadening of the scleral ring with haziness of the retinas. The patient uses tobacco and alcohol injudi-

ciously, and has done enormous amounts of eye work.

O.D. + 1.75s \bigcirc + .75c axis H $\frac{20}{20}$. O.S. + 1.50s \bigcirc + .75c axis H $\frac{20}{20}$. These glasses together with an antiseptic wash afforded relief; the patient was not, however, under observation very long.

Case 13. Epiphora; Slight Ocular Pain.—J. R., a boy aged 8, complains of slight pain in his eyes and constant watering, especially after the act of reading; scarlet fever in youth, but no recent illness; headaches practically never present. In each eye an oval, unduly capillary disc and typical shot-silk retina.

O.D. + 1.50s \bigcirc + .90c axis 45 $\frac{20}{20}$. O.S. + 1.25s \bigcirc + .60c axis 165 $\frac{20}{20}$. One month later reports himself better, though the eyes occasionally grow red; watering has stopped; there are a few swollen lymph follicles on the retrotarsal folds.

These thirteen cases varied in age from eight to sixty-seven years, and presented as their most prominent complaint one or other of the symptoms noted in the group heading—symptoms commonly seen in all forms of refraction error, and occurring quite as frequently in cases of usual astigmatism, and even in simple hypermetropia and myopia. In two of the cases evidence of general disease required appropriate constitutional remedies, and in one hysteria was a strong factor. It is again noteworthy in four of the cases that the addition of a weak cylinder to a spherical glass which previously had been

worn for reading produced a result not attained by the former correction, and that in six of the examined eyes the astigmatism was neutralized by a 0.25 D cylinder.

III. Cases characterized by various types of headaches aggravated by the use of the eyes.

Case 1. Peri-ocular Pain and Occipital Headache.—L. M., a woman aged 56; in delicate health; nausea and backache; peri-ocular, frontal and occipital headache. Grey-red discs, distended lymph sheaths, areas of fine, yellowish-white spots in macula. Urine slightly albuminous and containing hyaline tube casts.

O.D. + .25s \odot + .90c axis H $1\frac{5}{8}$. O.S. + .50s \odot + .75c axis H $1\frac{3}{4}$. The presence of Bright's disease in this case rendered it impossible to judge of the value of the glasses in relieving the headache.

Case 2. Nocturnal Headache.—B. C., a woman aged 40; general health good; misty vision and a feeling of fulness in head; nocturnal headaches after evening use of eyes; discs too capillary, and faint retinal haze.

O.D. + 1.25s \odot + .90c axis 10 $1\frac{5}{8}$. O.S. + 1.25s \odot + .50c axis 165 $1\frac{5}{8}$. Entire relief resulted.

Case 3. Severe Supraorbital Neuralgia.—D. W., a man aged 61; chronic rheumatism; gouty ancestry; severe supraorbital neuralgia; failing vision especially in O.D.

O.D. + 1.s \odot + .50c axis 15 $2\frac{0}{8}$. O.S. + 1.s \odot + .50c axis H $2\frac{0}{8}$. In the right eye grey-red disc and unduly prominent scleral ring; field

contracted. In left eye fundus normal except broadening of the scleral ring. Reading power improved; supraorbital neuralgia not relieved; this was probably rheumatic.

Case 4. Severe Frontal Headache.—J. M., a girl aged 17; general health usually good; slight menstrual derangement; frontal headache severely aggravated by eye use. Fundus normal.

O. D. + 1.25s \odot + .60c axis H $\frac{20}{20}$. O. S. + 1.25s \odot + .60c axis 165 $\frac{20}{20}$. These glasses afforded entire relief except during the menstrual epoch when considerable asthenopia appeared.

Case 5. Frontal Headache.—S. W., a young man aged 18; general health good; no complaint except frontal headache after reading or study; discs normal in color; scleral rings unduly broad; veins and lymph sheaths distended.

O. D. + 1.s \odot + .90c axis H $\frac{15}{12}$. O. S. + 1.s \odot + 1.25c axis 165 $\frac{15}{12}$. The result was entirely satisfactory.

Case 6. Right-sided Headache, Neuralgic in Type.—M. D., a woman aged 59; delicate health, the result of a long standing *fistula in ano* and a severe attack of typhoid fever; cannot read with any comfort, severe headache the invariable result; is wearing simple sphericals.

O. D. + 1.s \odot + .50 c axis H $\frac{15}{15}$. O. S. + 1.25s \odot + .25c axis H $\frac{15}{15}$. Much relief followed the use of the new glasses.

Case 7. Peri-orbital Pain and General Headache.—P. D. K., a woman aged 30, feeble general health without definite disease; severe general

headaches and photophobia aggravated by eye use. Oval discs, nasal edges veiled, choroids woolly.

O. D. +.25s \bigcirc + .50c axis H $\frac{15}{16}$. O. S. + .50s \bigcirc + .50c axis H $\frac{15}{16}$. Greatly improved in all respects without the use of general medication.

Case 8. Constant Temple Headache.—M. D. G., a boy aged 18, general health good; constant temple headache with some lachrymation. Oval, over-capillary discs, with veiling of the nasal edges.

O. D. + .50s \bigcirc + .50c axis 15 $\frac{20}{16}$. O. S. + .50s \bigcirc + .25c axis 165 $\frac{20}{16}$. Satisfactory result.

Case 9. Constant Left-sided Head-Pain.—H. R. C., a man aged 90, general health perfectly good; dull ocular pain and sharp left-sided headache, with some photophobia. In the right eye round disc, color good, but scleral ring too plainly marked; left eye, oval disc, gray, veins and lymph sheaths full.

O. D. + .90s \bigcirc .50c axis H $\frac{20}{16}$. O. S. + 1.s \bigcirc + .50c axis 165 $\frac{20}{16}$. There was entire relief.

Case 10. "Sick Headache."—M. A., a woman aged 50, good general health; numerous sick headaches brought on by eye use, with unsatisfactory reading power. Oval, healthy discs.

O. D. + 1.50s \bigcirc + .50c axis 150 $\frac{20}{16}$. O. S. + 1.50s \bigcirc + .50c axis 30 $\frac{20}{16}$. These glasses afforded relief when combined with proper reading lenses.

Case 11. Occipital Headache.—S. M., woman aged 47, cardiac asthma from mitral disease, has had rheumatism; severe occipital headache aggravated by eye use, ordinary convex sphericals useless.

O. D. + .50s \bigcirc + .60c axis $15\frac{2}{3}^\circ$. O. S. + .50s \bigcirc + 1.c axis $165\frac{2}{3}^\circ$. The occipital headache had disappeared when the patient was last seen.

Case 12. Occipital Headache.—J. H. T., a man aged 38, general health good; has worn glasses for four years (+ 1.5); recently complains of not seeing well and pain in the occiput after eye use. In each eye an oval disc, with a slight patch of choroiditis at the outer margin; central lymph sheaths full. O. D. + 1.50s \bigcirc $\frac{2}{3}^\circ$.50c axis H $\frac{2}{3}^\circ$. O. S. + 1.50s \bigcirc .50c axis H $\frac{2}{3}^\circ$. The result was perfectly satisfactory.

Case 13. Severe Brow Pain.—M. L., a girl aged 16, slender, anæmic, occasional dysmenorrhœa; for two years has suffered with violent attacks of brow pain, slight ache being more or less constant, and the explosions of headache being severe enough to put the patient to bed. They were often noted on Saturday or Sunday. The ophthalmoscope reveals in each eye an oval optic disc, unduly capillary, and all the edges blurred by a hazy retina; in other words, a typical eye-strain eye-ground.

O. D. + .75s \bigcirc + .60c axis $15\frac{2}{3}^\circ$. O. S. + .75s \bigcirc + .75c axis H $\frac{2}{3}^\circ$. These glasses, together with discontinuance of the studies, the administration of iron and occasional doses of bromide of lithium, revolutionized this girl. She is to-day practically free from headaches, or at least they come with great rarity. Her color has improved, her hæmoglobin has mounted to normal, and the eye grounds have vastly improved. It should be

noted, however, that with the glasses there was careful regulation of her habit of life, and the almost continuous use of iron in the form of Bland's pills.

Case 14. Severe General Headache.—H. F., a woman aged 30, from early childhood has been subject to violent general headaches, considering herself fortunate if she passed a day without some pain in the head; this was invariably brought on in a violent degree by use of the eyes. In girlhood she was removed from school on this account. With this exception, there is no general disturbance. Curiously enough, her eyes were never examined. Each eye presented an oval optic disc of fairly good color, and no changes in the fundus. O. D. + 2.75s \bigcirc + .50c axis H $\frac{20}{20}$. O. S. + 4.50s \bigcirc + .50c axis H $\frac{20}{20}$. Very marked relief followed the use of these glasses.

Case 15. Violent Headaches of the Migrainal Type.—A. J., a woman aged 50, had for years suffered with violent headache, worse in the eye, top of the head and back of the ear, generally one-sided, without positive prodromes, and sometimes followed by nausea; has tried all manner of medication, and on the examinations of very competent general practitioners was pronounced to be free from constitutional reasons for such headache. She is, however, an anæmic woman, slender, and readily worried, having met with considerable business reverses. The eye-grounds were healthy; in each eye an oval optic disc of about normal color.

O. D. + .75s \bigcirc + .75c axis 30 $\frac{20}{0}$. O. S. + .75s \bigcirc + .75c axis 165 $\frac{20}{0}$. These glasses did not cure the headache; in fact, at the last account she was not relieved by them except as aids to reading. She was a peculiar, somewhat vain, old maid, and declined to wear the distance glasses. It is possible that had she consented to the constant use of glasses the result might have been better.

Case 16. Violent Temple and Brow Headache.—W. J., a woman aged 35, except for occasional attacks of gastralgia, probably a symptom of one of the types of dyspepsia, usually induced by imprudence in eating, is in good general health. She suffers from violent temple and brow headache, and is subject to excessive exacerbations of these pains. In each eye a slightly oval, unduly capillary optic disc; the retinas fairly good. She has worn + 4.50 D without relief.

O. D. + 5.50s \bigcirc + .50c axis 15 $\frac{20}{0}$. O. S. + 7.50s \bigcirc + .60c axis 165 $\frac{20}{0}$. These glasses cured the headaches.

Case 17. Typical School Headaches.—A girl aged 13, in good general health, complains of brow pain at the end of each school hour, and that the eyes feel as if they were being pushed inward. Oval discs, slight crescents and some retinal haze.

O. D. + 1.75s \bigcirc + .25c axis 150 $\frac{20}{0}$. O. S. + 1.75s \bigcirc + .25c axis H $\frac{20}{0}$. No headaches occurred unless she laid aside her glasses.

Case 18. Constant Headaches.—S. E. C., a

woman aged 45, states that since her 15th year she has had constant headache, its chief location being in the brow and temple; she is fairly well nourished without constitutional taint, but with a neurasthenic tendency and a habit of trying all manner of doctors. Remedies have proved unavailing in her headache; five graduated tenotomies have been done; these, she states, relieved for a time the headaches which now, however, are constant and severe. She wears for distance + .50s and for reading + 2.50s. Each disc an oval, its surface slightly œdematous and all edges hazy; numerous lymph reflexes.

O. D. + 1.5 \bigcirc + .25c axis 15 $\frac{20}{20}$. O. S. + 1.5 \bigcirc + .50c axis 165 $\frac{20}{20}$. After wearing these glasses for some time she states that they help her eyes but the headache continues to be present, although not so severe, in the brow and temple. She has undergone careful six-weeks rest-cure and is generally much improved.

Case 19. Violent Scattered Head pain; No Relief from Drugs.—A. B. H., a man aged 35, has had no serious illness since his 17th year, when he suffered from scarlet fever, but had a slight heat stroke eight years ago. He is very bilious; works in tobacco, but uses the drug moderately. His present trouble began five years ago in the form of shooting pains in the head, previous to which time he suffered from sick headaches. These pains locate themselves in different spots, and are intensely violent and neuralgic in type. In each eye a round disc with some patches of

white over the central vessels; rather full veins, but otherwise normal eyegrounds.

O. D. + .50c axis 150 $\frac{20}{0}$. O. S. + .37c axis 30 $\frac{20}{0}$. With the exception of a few doses of croton chloral hydrate the patient had no remedies after the prescription of these comparatively weak cylinders, and yet the relief was almost immediate and has continued ever since, the treatment having been instituted many months ago.

Case 20. Periorbital Pain.—G. P. S., a woman aged 49, rather delicate in constitution and yet without organic disease, complains of a peculiar pain, which is described as "drawing" in the brow and over the eye after reading and writing; this pain speedily produces nausea. In each eye an oval disc, the edges slightly blurred by hazy retinas.

O. D. + 2.5 \bigcirc + .25c axis H $\frac{20}{0}$. O. S. + 1.75s \bigcirc + .50c axis 150 $\frac{20}{0}$. These glasses combined with suitable presbyopic correction, were of great assistance, and reading and writing is now done with comparative ease, although eye endurance is not great. The previous correction was similar except that the astigmatism had been unnoted.

Case 21. Vertex and Occipital Headache.—M. J. A. a woman aged 51, is excessively anæmic, having had two attacks of hæmatemesis, in the last of which she nearly perished, probably depending upon ulcer of the stomach; she is deaf from catarrhal disease of the Eustachian tubes.

Numerous *muscæ* float before each eye. In each the edges of the disc slightly hazy, the choroid a little woolly, a few yellowish dots scattered through the eyeground but no hæmorrhages; the color of the discs pallid.

O. D. + 1.75s \bigcirc + .50c axis H $\frac{2}{80}$. O. S. + 1.75s \bigcirc + .60c axis 15 $\frac{2}{80}$. These glasses and a suitable presbyopic correction combined in bifocals, may have produced some relief, but the eyes are far from comfortable and the eye endurance exceedingly limited. It could not reasonably be expected that any great impression would be made in a woman whose hæmoglobin was so much below the normal from excessive hæmorrhages.

Case 22. General Headache.—A. H. T., a woman aged 30, always complained of weak eyes; never has had any severe illness. In childhood fell upon the head, without, however, producing a fracture; in early childhood had convulsions attributed to indigestion; for years has suffered with violent headaches beginning in the eyes, becoming general and ending in nausea. Drugs have been useless. In each eye the disc is oval, the surrounding retina hazy and the surface of the papilla a little woolly.

O. D. + .75s \bigcirc + .25c axis 30 $\frac{2}{80}$. O. S. + .75s + .25c axis 150 $\frac{2}{80}$. After wearing these glasses for several months she reported an entire absence, with one exception, of headaches.

Case 23. Brow Headache After Study.—F. R., a boy aged 14, had diphtheria and scarlet fever in infancy, but is perfectly well now; complains

of the ordinary brow pain after evening study hour so common in children; occasionally the headache becomes general. With the exception of unduly full veins which are slightly tortuous there are no changes in the eyeground.

O. D. + 1.25s \bigcirc + .50c axis H $\frac{2}{3}\%$. O. S. + 1.50s \bigcirc + .25c axis H $\frac{2}{3}\%$. The relief was complete.

Case 24. Severe Occipital Headache.—E. M., a woman aged 45, has had a complication of troubles which may briefly be stated as double vision from paralysis of one or other of the ocular muscles (it is not known now which) followed by Bell's palsy, the remains of which are still apparent, and having had as her most recent illness a miscarriage, one other having also occurred, in all instances the probable result of specific taint. There were no changes in the eyeground to indicate constitutional disease and she sought relief for violent occipital headache.

O. D. + 1.5 \bigcirc + .50c axis 30 $\frac{2}{3}\%$, O. S. + 1.5 \bigcirc + .75c axis 150 $\frac{2}{3}\%$. This, or a formula very nearly like it, together with a suitable presbyopic correction, she had worn for some time and with some relief, but the headache continued. A slight change was made in the cylinders, without much relief to the headache, which also did not yield to anti-specific treatment. A thorough examination of the urine revealed some albumin and here and there a tube cast. Under proper diet, combined with Basham's mixture and small doses of bichloride of mercury, the occipital pain was relieved. In this instance it is evident that the astigmatism

was not the cause of the pain, and that its correction consequently yielded no result.

Case 25. Violent General Headache.—G. S., a woman aged 31, for four years has suffered with violent headaches, somewhat relieved but by no means set aside by glasses which imperfectly corrected her astigmatism. One year ago she had nervous prostration, and has suffered at times with rheumatic pains in the shoulders; otherwise the health appears to be good. In each eye there is an oval, distinctly gray optic disc.

O. D. + 3.5 \bigcirc + .75c axis H $\frac{20}{25}$. O. S. + 25. \bigcirc + .50c axis H $\frac{30}{60}$. Three months after the correction the patient reported that she had scarcely any headache, although previous to that time it was rare to pass a day without one. It is interesting to note that in this case she previously wore a correction of her astigmatism, just half of the amount having been ordered, with almost no correction of the hypermetropia and with no good result.

Case 26. "Sick Headaches."—E. L. S., a woman aged 45, some years ago had typhoid fever; since then has been well, but has lost much sleep by nursing; wears simple sphericals which are not satisfactory; always has had much headache, which begins over left eye, spreads through head to occiput, and also has many "sick headaches," beginning in the same way. The optic discs are pallid, with marked scleral rings surrounding them; otherwise no changes.

O. D. + .60s \bigcirc + .25c axis H $\frac{20}{60}$. O. S. +

.60s \odot + .25c axis H $\frac{20}{20}$. Three months after the use of these glasses, together with the necessary convex addition for reading, which was combined with a 2.5° prism base in, the patient reported herself much better.

Case 27. Severe Frontal Headache.—W. J. S., a woman aged 48, with the exception of considerable nervousness and ready succumbing to fatigue, is in good general health. She has worn glasses for twenty-three years, always simple sphericals, and for years has suffered with violent pain beginning in the forehead and passing to the occiput, coming in spells sometimes lasting for two days at a time. These headaches are induced not alone by reading or eye work, but by any fatigue. There are faint striæ in the far periphery of each lens. The discs are oval, of good color, maculas normal; some filling of the central lymph sheaths.

O. D. + 5.5 \odot + .75c axis H $\frac{20}{20}$ —. O. S. + 5s. \odot + .90c axis 15 $\frac{20}{20}$ —. Three months later this patient reported herself better in every way, having had only one headache and no eye pain.

Case 28. Ordinary School Headaches.—B. B., a girl aged 16, has worn glasses for four years, very much an under-correction of her refraction error and without note of the astigmatism. She is subject to tonsillitis, has some indigestion and a great many comedones on her face, probably connected with the indigestion, perhaps with menstrual disturbance; complains of indistinct vision and headache coming on after school, with ina-

bility to maintain accurate close vision. In the right eye an oval disc, the surface a little woolly, and a slight crescent at the outer side. In the left eye an irregularly oval disc with distinctly mellowed edges and many lymph reflexes through the fundus.

O. D. + 2.5 \bigcirc + .12c axis H $\frac{2}{2}$ °. O. S. + 3.25s \bigcirc + 1.25c axis 15 $\frac{2}{2}$ °. Several months after this correction was ordered marked relief was reported.

Case 29. Occasional Brow Pain; a Good Deal of Nervousness.—J. J. R., a woman aged 35, was glassed six years ago, and wears a correction similar to the one given below, but slightly under the total amount of astigmatism; declares that she is in good general health, a report which is confirmed by her physician; complains of limited eye endurance, headache over the brow and pain darting in the right eye; cannot use the eyes at night, and "gets nervous from her eyes." In each eye a typical eye-strain appearance, namely: slightly veiled edges of the disc, full lymph sheaths, and fine œdematous haze of the retina.

O. D. + 2.5 \bigcirc + .90c axis 165 $\frac{2}{2}$ °. O. S. + 1.75s \bigcirc + .90c axis H $\frac{2}{2}$ °. A month later she reported progress, but still complained of some pain and the nervous feeling when she used her eyes. The eye-grounds were still very irritable.

Case 30. Post-ocular Headache.—A. A., a woman aged 38, has worn glasses for ten years, recently having a correction closely similar to the one given below, but also an under-correction;

she is much confined at her business and is in poor general health from lack of exercise, without any definite illness; is very nervous. The eyes feel strained, and their use brings on severe pain situated behind the orbit. In each eye a round disc with a shallow excavation, the papilla being surrounded by a somewhat hazy retina.

O. D. + 2.5 \bigcirc + .50c axis 30 $\frac{2}{3}$ °. O. S. + 1.75s \bigcirc + .75c axis 150 $\frac{2}{3}$ °. These glasses were a help, but a vacation, complete rest, and some general medication were also used.

Case 31. Temporal Headache; Ocular Pain.—A. R. L., a man aged 29, uses his eyes a good deal; is a trained athlete and generally in good health; formerly he was subject to vertigo which now has entirely subsided; at present complains of pain in the eyeballs nearly constant, and when headaches come on, which is not infrequent, the pain is situated in the temples. In each eye an oval hyperæmic optic disc, the eyegrounds showing superficial choroidal disturbance.

O. D. + 1.25s \bigcirc + .25c axis 165 $\frac{2}{3}$ °. O. S. + 1.25s \bigcirc + .25c axis 15 $\frac{2}{3}$ °. These glasses appear to have given comfort thus far, but the eyegrounds are not in good condition and rest has been enjoined.

In these thirty-one cases various types of headaches occurred, which were relieved promptly by the correction, except when the pain had evident origin in some constitutional condition, namely, in cases 1 and 3; and when, as in cases 15, 18, and 29, although no exact

constitutional reason for the headache was ascertained, the general system probably was at fault, or sufficient time for the irritability of the eyegrounds to subside had not yet elapsed. In other words, the relief was exactly the same as that which is afforded by the correction of the ordinary errors of refraction associated with headache. It did not seem in any of the cases that the headache was more severe than that often noted in cases of astigmatism according to the rule, nor was there in any case marked general disturbance, as the apparent result of the eye-strain, except, perhaps, in case 7, where a feeble young woman improved greatly in all respects without the use of any general medication. In several cases general tonic medication was employed in addition to the optical therapeutics—a precaution often advisable as an adjunct in the treatment of “eye-strain” headaches. The ages of these patients varied from 13 to 61 years.

IV. Cases characterized by ocular changes — incipient cataract, with or without headache; and glaucoma.

Case 1. Simple Chronic Glaucoma.—S. E., a woman aged 50; has had much mental worry, otherwise no illness; dim vision in the right eye for several months; frequent changes in glasses; periods of obscuration of vision; no headache. Right eye, round disc excavated to margin, especially deep above and to nasal side, buff-colored rim with halo all round. T. + 2.

Left eye, round disc, small central excavation; veins full and pulsating. Anterior chamber in both eyes shallow; the nasal field in O.D. absent; in O.S. contracted.

O.D. + 2.5 \bigcirc + .60c axis 15 $\frac{20}{0}$. O.S. + 2.25s \bigcirc + .60c axis H $\frac{20}{0}$. Twenty months later the central vision in O.D. was $\frac{20}{70}$; in O.S. $\frac{20}{30}$. The patient has used continuously eserine. The field of vision has not materially changed.

Case 2. Simple Chronic Glaucoma.—A. H. D., a woman aged 65; easily worried; a poor sleeper; has chronic dyspepsia; obscured vision in the right eye above the horizontal line; pain in the back of neck; many changes in glasses. In the right eye a narrow anterior chamber; nerve horizontally oval; complete, shallow, glaucomatous cup and halo; T + 1. In the left eye oval disc; partial excavation; halo-like band. In the field of the right eye there was complete loss of the upper and inner quadrant; in the left contraction of the lower inner portion.

O.D. + .50s \bigcirc + .50c axis 15 $\frac{20}{15}$. O.S. + .50s \bigcirc + .50c axis 165 $\frac{20}{0}$. Iridectomy was done on the right eye when vision began to fail ($\frac{20}{40}$), with good result.

Case 3. Incipient Cataract; Ocular Pain.—C. S., a woman aged 70; well preserved; general health, except for rheumatism, good; unsatisfactory reading glasses—simple convex sphericals; eyes pain. Oval discs; sharp scleral rings; choroids fair; striæ in the anterior cortices.

O.D. + 2.50s \bigcirc + .75c axis 15 $\frac{2}{3}$. O.S. + 2.50s \bigcirc + .60c axis 165 $\frac{1}{3}$. The result was increased comfort to the patient.

Case 4. Incipient Cataract; Occipital Headache.—S. A., a man aged 54; is the subject of muscular rheumatism and occipital headache; eyes readily tire at close work. Irregularly oval, gray discs; sharply marked scleral rings; fine, dust-like opacities in the periphery of each lens.

O. D. + .25c axis 15 $\frac{2}{3}$. O. S. + .25c axis 165 $\frac{2}{3}$. These cylinders, incorporated with suitable convex sphericals for reading purposes, gave great satisfaction. Iodides, however, were ordered.

Case 5. Incipient Cataract; Occipital Headache.—W. W. G., a woman aged 54; imperfect health, although complexion ruddy; asthma (renal?); occipital headache; trigeminal neuralgia; reading glasses unsatisfactory; many follicular granulations in the conjunctival cul-de-sac. Oval, gray discs and fine striæ in the anterior cortex of each lens; albumin, hyaline and granular casts in the urine.

O.D. + 2.50s \bigcirc + .25c axis H $\frac{2}{3}$. O.S. + 2.5 \bigcirc + .25 c axis 165 $\frac{2}{3}$. The result of the change of glasses in this case was at last accounts not an improvement. The local condition of the conjunctiva precluded the possibility of any satisfactory eye work.

Case 6. Incipient Cataract; Frontal Headache.—B. C. G., a woman aged 60; general health moderately good; subject to "sick headaches;"

at times bilious; urine normal; eye pain with sharp frontal headache caused by reading; glasses—simple convex sphericals—not satisfactory. Small oval discs with yellowish dots in the macula; many shoots in the periphery of each lens.

O.D. + 1.75s \bigcirc plus .90c axis 150 $\frac{2}{3}$ °. O.S. + 2.s \bigcirc + .50c axis 60 $\frac{2}{3}$ °. Distinct relief has followed the new correction. The patient, however, has taken alternately iodide and bromide of potash, and strychnia.

Case 7. High H As.; Incipient Cataract.—T. A. H., a woman aged 68; general health moderately good; sciatica at times and occasional attacks of bronchitis; convergent squint since childhood; seeks advice for improvement in vision; wears sphericals only; no headache. Oval, rather grey-red discs with mellow margins. Incipient cataract in each eye.

O.D. + 2.50s \bigcirc + 2.c axis 150 $\frac{2}{3}$ °. O.S. + 4.s \bigcirc + 1.50c axis 165 $\frac{2}{3}$ °. The improvement in vision, which was considerable, afforded the patient great satisfaction.

Case 8. Incipient Cataract; Pain in the Occiput.—E. C., a woman aged 61, has a mitral murmur and complains of pain after reading, sewing and the like, with some smarting and burning of the eyelids and pain in the occiput. In each eye an oval, distinctly gray optic disc. In the right eye the lens hazy, in the left striæ in the anterior cortex.

O.D. + 4.50s \bigcirc + .75c axis H $\frac{2}{3}$ °. O.S. +

4.50s \bigcirc + .25c axis H $\frac{2}{3}0$. These glasses afforded her considerable relief, although prolonged reading still produces some burning in the eyelids.

Case 9. Incipient Cataract; Vertigo; Occipital Headache.—J. V. B., a woman aged 58, suffers from chronic indigestion and vertigo of such a type that the tendency is to fall forward; occasional attacks of severe headache in the occiput; heart and kidneys normal. In each eye an apparently healthy optic disc, except for undue broadening of the scleral ring. Large flocculent opacities in the anterior cortex of each lens, not yet encroaching upon the pupillary space.

O. D. + 1.5 \bigcirc + .50c. axis H $\frac{2}{5}$. O. S. + 1.5 \bigcirc + .50c axis H $\frac{2}{5}0$. These glasses afforded relief, but it should be stated that the patient was also under treatment for the chronic indigestion, and the regulated diet and medicinal measures were potent factors in relieving the vertigo. The headache appears to have been due to uncorrected astigmatism. The patient has not reported quite lately, and the present result is unknown. It is an interesting fact that through the distance glasses there was orthophoria for the distant point; without them a slight right hyperphoria.

Case 10. Incipient Cataract; no Headache.—J. E. W., a woman aged 70, complains of no headache, but some slight pain in the eyeballs; uses her eyes incessantly as an artist doing the finest kind of painting. With the exception of some dyspepsia and a recent attack of influenza,

the general health is good. In each eye there are striæ in the anterior cortex, radiating irregularly towards the pupil. Each disc is oval, gray, and the central lymph sheath full. The maculas are normal.

O. D. + 1.25s \bigcirc + .75c axis H $\frac{20}{30}$. O. S. + 2.5 \bigcirc + .25c axis H $\frac{20}{30}$. The patient expressed satisfaction with the glasses.

Case 11. Incipient Cataract; Slight Conjunctivitis.—W. T., a man aged 62, in good general health with the exception of an attack of influenza, from which the convalescence was slow, complains that the right eye inflames, the vision is dim and the glasses not clear; there is no headache. In each eye an oval disc, with undue broadening of the scleral ring, and the surface distinctly gray-red. In each lens small opacities down and in, in the anterior cortex, and the circle surrounding the nucleus slightly hazy.

O. D. + .50s \bigcirc + 1.25c axis H $\frac{20}{20}$. O. S. + .90c axis 150 $\frac{1}{2}$. These glasses, together with reading sphericals, were ordered. The patient appeared to see with satisfaction, but complained still of the irritation so common in incipient cataract. It should be stated that there was also some squamous blepharitis.

Case 12. Incipient Cataract; Slight Vitreous Opacities; Occipital Headache.—J. A., a man aged 61, has had rheumatism, but with the exception of an attack of influenza in last October, which much prostrated him, has been in good condition. Since then has complained of floating spots before

the right eye; he has some headache, chiefly in the occiput. In the right eye an oval, rather gray disc, fine haze in the vitreous and some striæ in the lens. In the left eye the conditions are similar, except no vitreous change was noticed. In each the retinas were hazy.

O. D. + 1.25s \bigcirc + .50c axis H $\frac{20}{20}$. O. S. + 1.5 \bigcirc + .50c axis H $\frac{20}{20}$. The vision, however, was not clear, being misty, especially on the right side.

Case 13. Incipient Cataract; Pain in the Eyeballs.—J. B., a man aged 58, complains of some pain in the eyeballs, worse upon the left side; occasional brow ache. With the exception of a severe fall in the winter, which shocked him considerably but did not break any bones, there has been no noteworthy fact in his recent history. There is a slight haze around the perinuclear tissue of the lens, and a few fine opacities. Each disc is gray-red and contains a small central cup; in each macula a few fine yellowish dots.

O. D. + 1.5 \bigcirc + .75c axis 150 $\frac{20}{25}$. O. S. + 1.5 \bigcirc + .50c axis H $\frac{20}{20}$. These glasses were ordered and eye rest enjoined.

Case 14. Incipient Cataract; Some Throbbing in the Temples.—P. J., a man aged 68, considers himself to be in good general health; has some post-nasal catarrh; complains recently of throbbing in the temples and insufficient eye endurance. In the right eye an irregularly horizontally oval disc, with slightly mellowed edges, and an atrophic broadening of the scleral ring.

There is superficial absorption of the choroidal pigment. In the left eye a rim of cortical opacities not yet encroaching upon the pupil, an oval disc which is very gray, and considerable epithelial choroidal change.

O. D. + 1.5 \bigcirc + .60c axis 165 $\frac{20}{20}$. O. S. + 1.50s \bigcirc + .50c axis 15 $\frac{20}{15}$.

Case 15. Incipient Cataract; Headache and Nausea.—J. A. T., a woman aged 55, six years ago had nervous prostration, since then has been exceedingly nervous and suffered from flitting neuralgic pains; the nervousness is increased by reading, which also brings on headache associated with nausea. In the right eye there is a slightly gray, oval disc, without conus; small, fluffy opacities in the lens. In the left eye a similar oval disc and similar opacities, one spear-shaped stria passing towards the pupil space. Here and there in the choroid are fine yellowish dots.

O. D. + .25c axis H $\frac{20}{20}$. O. S. + .50c axis 165 $\frac{20}{20}$. This was added to a suitable presbyopic correction and worn with a good deal of satisfaction—the patient, however, was restricted in reading and given alteratives, chiefly in the form of bichloride of mercury.

The two cases of glaucoma are interesting in connection with Dr. Theobald's investigations as to the possibility of astigmatism being a factor in the development of this disease. They are further interesting because of the sharp central vision which was obtained by a correction of the

astigmatism, and the influence of instillations of eserine. Both of these cases had been entirely unconscious of any serious eye trouble, and wondered why the frequent glasses which they purchased without consultation had never permitted them to see well or comfortably. The thirteen cases of incipient cataract were all, up to the present date, relieved by the addition of the cylinders to their reading glasses and the use of the correction for constant wear, with the single exception of the case associated with Bright's disease and granular lids, although in three of them no marked change for the better can be recorded. The importance of the correction of the entire error of refraction in incipient cataract has been dwelt upon frequently, especially in the able communication of Dr. S. D. Risley¹ upon this topic. It is, perhaps, worth while to emphasize the fact that the very presence of striæ in the lens determines an astigmatism, and that this should be searched for and corrected; and moreover, that these corrections should be the subject of reëxaminations at stated periods, because the refraction must necessarily change in eyes the lenses of which are swelling under the influence of cataract formation. With such correction, however, aided by alteratives and tonics, much of the distress, either in the eyes themselves, or in the head, in the form of headache, which not infrequently is associated with the

¹ University Medical Magazine, March, 1889.

early stages of cataract, may be alleviated. In this particular it is necessary only to refer again to Dr. Risley's paper. I would call attention to the good central vision which was obtained in the incipient cataract cases when the opacities were still in the periphery, and had not encroached upon the pupil space. The ages of these patients varied between 50 and 70.

V. Cases characterized by various types of headache and associated nervous phenomena bordering on the type of the so-called "reflex neuroses."

Case 1. Subjective Vertigo.—K. E., a woman aged 57; general health moderate; constipated and has hæmorrhoids; much eye pain, lachrymation and distress when at close work; for the last six months vertigo, sudden and subjective, when looking to the right. Discs gray and general absorption of the pigment epithelium of the choroid. Discs on a lower level than the maculas.

O. D. + .25s \odot + 1.25c axis 15 $\frac{1}{2}$. O. S. + .75s \odot + 1.c axis 165 $\frac{1}{2}$. The use of laxatives and regulation of the general condition did not relieve the vertigo; the glasses did.

Case 2. Occipital Headache; Melancholia.—D. S., a woman aged 48; general health good at present; occasional attacks of depression; has had two periods of melancholia once requiring sequestration; severe occipital headache; muscæ. Oval discs, rather gray, with a patch of choroiditis at the outer side of each.

O. D. + .50s \odot + .50c axis 15 $\frac{1}{2}$. O. S. +

.50s \odot + .50c axis 165 $\frac{1}{3}$. These glasses afforded entire relief to the occipital headache. Owing to a high grade of insufficiency of the internal recti (exophoria), the corresponding reading glass was combined with prisms. There have been no attacks of melancholia since, and the woman's spirits are better, but the previous attacks of melancholia were so directly connected with grave disasters in the patient's immediate family that it would require a stretch of imagination to think that the eye-strain had had aught to do with their production.

Case 3. Marked Asthenopia: Typical Neurasthenia.—T. W., a woman aged 67; reasonable general health; marked asthenopia; cannot read for five minutes; easily depressed; has attacks of "night ptosis." Discs gray, with visible scleral rings, and fibre layers of the retinas somewhat opaque.

O. D. + 2.s \odot + .90c axis H $\frac{1}{5}$. O. S. + 2.s \odot + .75c axis H $\frac{1}{5}$. Great improvement followed the use of these glasses, and while the asthenopia has not disappeared entirely, the eye endurance has markedly improved. With this improvement in eye-tire the previous depression of spirits has disappeared correspondingly. In this case there was also a high insufficiency of the internal recti, and prisms were combined with the reading glasses. The "night ptosis," or in other words, a contracture or dropping of the upper lid which came on during the night, especially if the eyes had been used during the earlier

evening, making the patient desire to "prop up her lids," which she declared she could not voluntarily raise, is a curious symptom that I have twice noted in patients suffering from asthenopia and allied ocular conditions, and who were as well the subjects of general hysterical manifestations.

Case 4. Frontal and Occipital Headache; General Nervousness.—P. G. J., a woman aged 53; chronic acid dyspepsia; eyes pain; cannot get glasses to suit; severe frontal and occipital headache follows eye use at close ranges, which results in attacks of general nervousness unfitting her for her ordinary duties. Fundus healthy, but the discs rather pallid.

O. D. + 1.5 \bigcirc + .25c axis H $1\frac{5}{8}$. O. S. + 1.5 \bigcirc plus .50c axis H $1\frac{5}{8}$. The result in this case was very satisfactory.

Case 5. Fugitive Headache; Taciturn, Morbid and Moping.—J. H. L., a girl aged 13; beginning to menstruate; much headache unrelieved by general medication; photophobia; moping; unnaturally quiet, indisposition to any exertion. Discs with blurred edges, many lymph reflexes and hazy retinas.

O. D. + 1.50s \bigcirc + .75c axis H $2\frac{0}{0}$. O. S. + 1.50s \bigcirc + .25c axis H $2\frac{0}{0}$. Great relief followed, but the ocular treatment was associated with the use of iodides, bromides, iron and ergot. For a number of months she remained free from trouble, became more cheerful and pursued her ordinary duties; then a relapse took place, char-

acterized especially by photophobia, following an attack of fever somewhat remittent in type. The case has again improved without recorection by the aid of bromide and ergot. The glasses were certainly one of the factors in relieving the general nervous symptoms in this case.

Case 6. Occipital Headache; Vertigo.—B. N., a man aged 46; general health good; recurring attacks of congestion of the bulbar conjunctiva; occipital headache; aggravated vertigo. Horizontally oval, gray discs with absorption of the pigment epithelium.

O. D. + 1.5 \bigcirc + .50c axis 165 $\frac{20}{20}$. O. S. + 1.5 \bigcirc + .25c axis 15 $\frac{20}{20}$. In this case the correction did not relieve the vertigo, or had not done so at the patient's last report some time since. The headache was relieved and the reading power increased, but otherwise the ocular therapeutics were not sufficient to subdue the chief symptom for which he presented himself—vertigo.

Case 7. General Headache; Insomnia.—G. M., a man aged 64; has chronic gout; severe headache increased by eye use; reading well nigh impossible; aggravated insomnia. Horizontally oval discs, gray; many yellow dots in the macula; urine normal.

O. D. + 2.25s \bigcirc + .50c axis 15 $\frac{20}{20}$. O. S. + 2.50s \bigcirc + .60c axis 165 $\frac{20}{20}$. Great relief, as far as the headaches were concerned, followed the use of this correction. The insomnia also was markedly relieved, but this has fluctuated

very much according to the man's general condition and the absence or presence of gouty symptoms.

Case 8. Right-sided Headache: Excessively Nervous.—E. F., a woman aged 34; has casts and albumin in the urine; severe right-sided headache with pain in the eyes, the use of which caused great nervousness; weeps readily; is depressed; globus not present.

O. D. + 3.5 \bigcirc + .25c axis 165 $\frac{20}{0}$. O. S + 3.25s \bigcirc plus .50c axis 15 $\frac{20}{0}$. There was entire relief of the headache, and with its relief the nervousness was materially calmed. The patient was under treatment, also, for the coexisting Bright's disease, and it was difficult, owing to its presence, to determine which headaches belonged to eye-strain and which to the kidney disease, and also which one of these two factors was to blame for the excessive nervousness which amounted in its sum to manifestations closely resembling hysteria.

Case 9. Constant Morning Headache: Hypochondriasis.—W. L. H., a man aged 42; organs sound, but very nervous and despondent; thinks he has brain tumor and various other organic lesions; has had much mental worry; troublesome morning headache. Horizontally oval discs, rather gray. No change in the fields of vision.

O. D. + .75s \bigcirc + .50c axis 30 $\frac{20}{0}$. O. S. + .50s \bigcirc + .60c axis 165 $\frac{20}{0}$. There was gradual but decided relief of all symptoms; this, however, became complete only when a tonic reg-

imen, systematic exercise, and massage were added. The improved ability in reading and the disappearance of the morning headache were decided factors in relieving the mental depression.

Case 10. Occipital Headache; Vertigo.—D. M. J., a woman aged 44; general health poor; has chronic cystitis; has general vertex and occipital headache with a bruised feeling in the eyeballs; very distressing vertigo, especially when walking on the street. Slightly pallid discs with mellow edges, and fine, dust-like opacities in the anterior cortices.

O.D. + .90c axis 15 $\frac{20}{0}$. O.S. + .60c axis 165 $\frac{20}{0}$. These glasses afforded almost entire relief to the head symptoms with the exception of the vertex pain which persisted. The vertigo also disappeared. This is a good example of the fact that patients often suffer with two kinds of headache, the vertex headache being in this case almost certainly associated with pelvic disorders.

Case 11. Headache; Nervous Prostration; Vertigo with Nausea.—J. P., a woman aged 45; has had several attacks of nervous prostration; eye work causes nausea; general nervousness; this is apparent, especially when the eyes are used at distances midway between those which come into play in reading or close work, and at twenty feet or beyond. The fundus is normal.

O. D. + .50s \bigcirc + 1.50c axis 15 $\frac{20}{0}$. O. S. + 1.50s \bigcirc + .50c axis H $\frac{20}{0}$. The glasses in this case, which was seen in consultation, have afforded partial relief; certainly since their use the

patient is said to be in a more satisfactory condition, and thus has reported herself, but is not entirely free from the symptoms above detailed. There appears to be no organic disease.

Case 12. Vertigo.—C. E., a woman aged 45; general health good; menopause not yet begun; recent severe and constant vertigo. Oval discs with broad scleral rings.

O.D. + .37c axis H $\frac{20}{20}$. O.S. + .50s \bigcirc + .25c axis 60 $\frac{20}{20}$. The relief of the vertigo began with the use of the mydriatic, but the patient is also under general treatment.

Case 13. General Headache; Nausea; Muscular Twitchings.—S. C., a woman aged 29; complete nervous breakdown; muscular twitchings; insomnia; constant severe headache beginning as frontal and becoming general; eye-work causes nausea, increased headache, excessive nervousness and insomnia; organs sound. The fundus is normal except for some retinal haze.

O. D. + 1.s \bigcirc + .75c axis 15 $\frac{20}{20}$. O. S. + .50s \bigcirc + 1.c axis 165 $\frac{20}{20}$. Relief began with the mydriatic, and up to the present time the patient is better. She, however, at the same time is having massage. The case is still under observation, and the date too soon to state positively the ultimate result.

Case 14. Sensation of Falling Forward when Walking in a Crowd; Confusion of Ideas.—M. P. F., a man aged 35; up to two years ago in good health; then an attack resembling epi-

lepsy, but probably not epileptic; since then has had frequent attacks of mental confusion with a sense of falling forward, especially if walking on a crowded street; no general disease discovered. The fundus is perfectly normal, except a few yellow dots near maculas.

O. D. + 1.5 \bigcirc + .50c axis H $\frac{2}{2}0$. O. S. + 1.5 \bigcirc + 50c axis H $\frac{2}{2}0$. There has been only one attack since the patient was glassed. He is still under observation, which has extended over many weeks. He has taken no general medication.

Case 15. Severe Headache; Neurasthenia; Globus Hystericus.—S. J., a woman aged 35; very gouty ancestry; vertex and occipital headache; marked neurasthenia; globus hystericus at times; keeps eyes closed. Fundus normal except for slight retinal haze.

O. D. + .50c axis 15 $\frac{2}{2}0$. O. S. + .50c axis 165 $\frac{2}{2}0$. All symptoms better, but also under general treatment.

Case 16. Frontal and Occipital Headache; Nervous Prostration.—C. S., a man aged 60; in poor general health; recent complete nervous breakdown forbidding, in large measure, any mental labor; unable to read satisfactorily; dull occipital and sharp frontal headache; recently had an injury followed by typhoid symptoms (septicæmia?); media clear. Horizontally oval discs with mellow edges and deeper layers gray.

O. D. + .50s \bigcirc + .25c axis 15 $\frac{2}{2}0$. O. S. + .75s \bigcirc + .60c axis 165 $\frac{2}{2}0$. Distinct improve-

ment in reading power and mental effort followed the use of this correction. It is quite evident in this case, however, that the nervous prostration was the result of the shock occasioned by the injury, and the patient is now undergoing a rest treatment.

Case 17. General Headache; Excessive Nervousness and Paræsthesia of the Face and Throat.

—M. H., a woman aged 57; general health good and organs sound; for some years pricking sensations in the face and throat; occasional right-sided neuralgia; headache, and general nervousness, excessive after eye use. Oval, rather gray disc; a few spicules in the left lens.

O. D. + 3.5 \bigcirc + 1.c axis H $\frac{2}{2}\%$. O. S. + 3.50s \bigcirc + .50c axis 30 $\frac{2}{2}\%$. Relief has followed the treatment in this case which, however, did not consist alone in the prescription of glasses.

Case 18. Trigeminal Neuralgia; Vertigo or Faintness after Reading.—A. G. W., a woman

aged 56, fourteen years ago had ptosis of the right side, the remains of which are still apparent; general health now good, but complains of dim vision, easily tired eyes, sometimes a subjective vertigo, or perhaps more accurately, feeling of faintness, and very constant attacks of trigeminal neuralgia. There is much eye trouble in the family. The father is blind from glaucoma and the brothers and sisters are all hypermetropic and astigmatic to a considerable degree. The ophthalmoscope revealed oval optic discs with unduly broadened scleral rings; no cupping;

the media clear; and the retinas fairly healthy.

O. D. + .50s \bigcirc + .60c axis 150 $\frac{20}{30}$. O. S. + 1.8 \bigcirc + .60c axis H. $\frac{20}{30}$. These glasses relieved the faintness or vertigo, but had no influence upon the trigeminal neuralgia, which is probably connected with a gouty taint that runs through the family.

Case 19. Occipital Headache; Insomnia.—L. D., a man aged 49, complains of burning in his eyes after reading for a short time, also of brow and occipital headache; he has stubborn insomnia. He uses simple convex sphericals for reading. The patient for many years has had chronic diarrhœa and leads a very sedentary life. The ophthalmoscope reveals in each eye a pallid, oval optic disc, with clear edges and reasonably healthy retinas.

O. D. + .50s \bigcirc + .50c axis 165 $\frac{20}{30}$. O. S. + .50s \bigcirc + .50c axis H. $\frac{20}{30}$. These glasses combined with a suitable presbyopic correction, were efficient in relieving the local inconvenience to his eyes and the headache, but had no influence upon the insomnia. This was in all probability connected with his anæmic condition which in its turn was secondary to the chronic diarrhœa. So, also, the headache was not entirely relieved, depending also probably largely upon constitutional causes.

Case 20. Ocular Pain; Neurasthenia.—J. M., a man aged 61, has broken down from business strain and complains of unequal vision, sore eyeballs and pain in the head. In the right eye

the disc is a large oval, pallid, the edges slightly mellow; in the macula are a few spots of choroidal degeneration; in the left eye a similar disc but no macular changes. Neither syphilis, albumin, sugar, nor demonstrable atheroma of the vessels was present.

O. D. + 1.5 \bigcirc + .50c axis H $\frac{20}{0}$. O. S. + 1.5 \bigcirc + .50c axis H $\frac{20}{15}$. These glasses appeared to prove satisfactory; the patient, however, was upon a very carefully regulated course of treatment including a modified type of the rest-cure with massage, electricity, etc., and consequently the effect of the glasses, except as aids to vision, cannot be estimated.

Case 21. Persistent Subjective Vertigo.—D. V. R., a man aged 56, who leads an active life, of full habit, a martyr to rheumatism, having had both endo- and pericarditis, and once an attack of peritonitis, for three months has had persistent vertigo. His present glasses, convex sphericals both for distance and reading, serve him a good purpose, but do not control the vertigo. In each eye an oval, gray-red optic disc, with mellowed and veiled nasal edges, exhibiting, in short, the appearances of a low grade neuritis.

O. D. + .50s \bigcirc + .75c axis 30 $\frac{20}{50}$. O. S. + .50s \bigcirc + .50c axis H $\frac{20}{0}$. The fields are distinctly contracted. There is right hyperphoria which fluctuates between one and four degrees. Diplopia is denied. These glasses afforded relief especially* when combined with a prism base down before the right eye, but they did not cure

the vertigo, which in this case was so evidently connected with circulatory disturbances. It is interesting, however, that they were distinctly a factor in such relief as the patient obtained.

Case 22. Vertigo and Pain in the Back.—F. P. C., a man aged 47, is compelled to use his eyes a great deal and complains of dizziness and pain in the back; his personal history is good; his digestion rather poor; he has had two severe illnesses in his previous life, once typhoid fever and once varioloid. Each optic disc was a vertical oval and contained a large physiological cup. There was some broadening of the scleral ring and slight retinal haze; in each macula fine yellowish dots; the urine, however, was normal.

O. D. + .60c axis 165 $\frac{2}{2} \frac{0}{0}$. O. S. + .60c axis H $\frac{2}{2} \frac{0}{0}$. Glasses may fairly be credited with having relieved the dizziness.

Case 23. Headache; General Neurasthenia.—D. W. M., a woman aged 60, of great activity, after prolonged mental strain broke down and presented a series of neurasthenic symptoms, associated with severe pain in the back of the head, rather of the character of soreness than anything else, and a feeling described as a "sinking away of the nerves." Both optic discs decidedly gray; otherwise no changes.

O. D. + 1.75s \bigcirc + .75c axis 15 $\frac{2}{2} \frac{0}{0}$. O. S. + 1.75s \bigcirc + .50c axis 165 $\frac{2}{2} \frac{0}{0}$. This and a suitable presbyopic correction, a month after its use caused the patient to report herself as doing well. It should be stated, however, that she was

under careful general treatment and had undergone a prolonged rest-cure, and that any mental work was forbidden, for, if it was undertaken, it was likely to produce a relapse.

Case 24. Fronto-occipital Headache; a Tendency to Fall Forward in Walking—A. J. Q., a woman aged 44, is in good health with the exception of an acid dyspepsia and a great deal of general nervousness, probably induced by much sorrow in her family; cannot read or thread the needle, and has a good deal of fronto-occipital headache; the most aggravated feeling is that of falling forward when walking, probably a species of vertigo. In each eye an irregularly oval disc with a partially absorbed choroid ring. In the right eye some slight macular changes.

O. D. + \odot 3.5 + .25c axis H $\frac{20}{20}$. O. S. + 3.50s + .50c axis H $\frac{20}{20}$. Her symptoms began to improve from the time the mydriatic was employed.

Of the twenty-four cases just detailed vertigo was a prominent symptom in eight of them, which either was relieved or cured in six by the use of the glasses, but unaffected in two. Ocular vertigo, usually subjective, is a common and constant symptom in errors of refraction, so much so that the investigation of a case is quite incomplete without a study of the eyes. It does not seem likely that it is any more common in cases of astigmatism against the rule than in those where the refraction error is according to the rule. In an analysis of one hundred cases of ordinary

far-sighted astigmatism, I think it is not very unlikely that eight of them, at the very least, would complain among other symptoms, of attacks of vertigo. Cases 14 and 24, in which there was a confusion of ideas and the sensation of falling forward, especially when walking in a crowd, might also be classed among the vertigos. In these cases the refraction error appears really to have been the exciting cause of the symptoms. I have seen two precisely analogous cases alleviated by the correction of a refraction error, the one of an ordinary myopic astigmatism of low grade, the other of a simple hypermetropic astigmatism. The mere feeling of falling forward as a symptom of errors of refraction, in common with all of my colleagues, I have seen many times, but in the cases detailed it was associated with a confusion of ideas and pallor of the cheeks of such a grade that at the original examination *petit mal* was suspected. Three of the cases were associated with hypochondriasis or melancholia. In one of the melancholic cases there could be no possible connection traced between the error of focus and the mental state. In the other two cases the glasses appeared to be one of the factors which brought about relief, although both patients were under systematic general medication. All the cases of neurasthenia and general nervousness — it is difficult to secure another expression to describe their sensations — were relieved by the use of glasses, just as the relief of eye strain, the result of the more ordinary types of

refraction error, will produce a like result; but general treatment was not lacking when indicated. In one of the cases of insomnia it was not possible to determine whether this was the result of the headache, of eye-strain or of the pain of gout; more probably, however, the latter. Insomnia, either simple in character, or the result of night headache, which in its turn is caused by eye-strain, is often indirectly relieved by the proper correcting lenses. In the woman who suffered from paræsthesia the effect of the glasses cannot be determined definitely because, in addition to their use, other measures of treatment were employed.

It seems from an examination of these cases that the associated symptoms, with perhaps several exceptions, were not more severe than would be present in a like number of cases of astigmatism according to the rule. It is very far from the purpose of this paper to belittle in any way the correction of all types of errors of refraction, for the purpose of improving ocular health, for relieving headache, and for removing a possible factor that may depress general nutrition and be the starting point of a reflex neurosis. But it certainly seems to the writer that in the present day there is a tendency to ascribe too much effect to the correction of refraction errors, and that because these exist the search for other causes of the associated symptoms at times becomes defective. When astigmatism against the rule exists, as Dr. Theobald has said, "We are warranted in correct-

ing fully every particle of the defect which we can render manifest," and which should thus be rendered by the judicious use of an active mydriatic. Perhaps in no other instance do we find the strikingly good effects of adding very weak cylinders to the combination of lenses; in a number of the instances detailed in this analysis the question of comfort or discomfort having been obtained by the finding or failing to find so low a degree as plus .25 D. The balance of the ocular muscles has not been recorded in the present series of cases, although it was studied carefully as a matter of routine practice. The presence or absence of insufficiency introduces an entirely different element, and its exact relation to reflex troubles of various types at present is being weighed in the balance. It is almost hackneyed to repeat what, however, sometimes is forgotten, that apparent insufficiencies, especially of low degree, disappear entirely after full and proper corrections, and with their disappearance the associated symptoms subside. This, as Professor Knapp has said, is one of the most thankful tasks which the practicing ophthalmologist performs. No where is it more necessary that this full and careful correction should be obtained than in examples of astigmatism contrary to the rule associated with low grades of insufficiency.

In conclusion, from these one hundred cases of astigmatism contrary to the rule certain facts may be ascertained.

Age. The following table represents the number of cases according to the age:

First decade.	2 cases.
Second "	9 "
Third "	5 "
Fourth "	14 "
Fifth "	25 "
Sixth "	26 "
Seventh "	17 "
Eighth "	2 "

It will be seen, then, that more than half the cases occurred between the ages of forty and sixty.

Sex.—The majority of the patients were women, thirty-one males, and sixty-nine females.

The Degree of Astigmatism.—This varied from a 0.12 of a dioptré to 2. dioptrés; the vast majority of the cases representing low grades of astigmatism, .50 to .90 dioptrés.

It may be concluded:

1. That the associated symptoms in these cases of astigmatism were not more severe than those which probably would have been found in a similar number of examples in which the refraction error was according to the rule.

2. That useful results follow the correction of the least degrees of measurable astigmatism—results which are not obtained when this correction is neglected, and that the mere presence of so-called normal central vision according to the ordinary best standards, does not preclude the possibility of low degrees of astigmatism being

present, which should be sought out and corrected.

3. That ocular health is conserved by such careful and thorough measurements of astigmatism, and hence indirectly general or so-called reflex disturbances are alleviated, but that these latter should never be ascribed solely to the astigmatism simply because this is present, when they may be the evident pointings of Nature for relief to be obtained by measures directed towards a constitutional vice, or an insufficient nervous tone.

4. That the importance of low degrees of insufficiencies of the ocular muscles should not be estimated until the effect upon them of complete correction of the astigmatism has been obtained.

5. That while no doubt in careful hands excellent results may be obtained by ophthalmometry and skiaskopy without mydriasis, the patient does not obtain the very benefit which is often most essential by the use of the mydriatic, namely, its local sedative influence and the complete rest which a thorough paralysis of the ciliary muscle entails. The most perfect correction placed upon an eye the subject of symptomatic retino-choroidal disturbance, fails to fulfil its function until the former has been subdued, and in its subjection prolonged mydriasis plays an essential part.

DISCUSSION.

DR. S. M. BURNETT, Washington, thought that astigmatism contrary to the rule was more productive of painful eye symptoms than when it

was according to the rule. He had never been able to find a satisfactory explanation of this, but he has found that 0.5 D of astigmatism contrary to the rule will generally cause more trouble than 1. D of astigmatism according to the rule.

DR. SAVAGE explained his theories of asthenopia in astigmatism in which the meridians deviate from the vertical or horizontal position. This is especially the case if there is asymmetry between the meridians of the two eyes. He illustrated how this asthenopia is produced by the oblique muscles rotating the eye on their antero-posterior axis in their endeavor to make an oblique meridian correspond to a vertical or horizontal one.

DR. JACKSON said he had observed no further trouble from astigmatism against the rule than with the rule.

